

IN THE UNITED STATES PATENT
AND TRADEMARK OFFICE

Applicant(s):	Wilsak et al.)	Group Art Unit: 1797
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Application No.:	10/663,918)	
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Confirmation No.:	2288)	
)	Examiner: Robert J Popovics
Filed:	August 30, 2005)	
)	
Title:	A Solid-Liquid Separation Process)	Attorney Docket No.: 37512-US

APPEAL BRIEF

(i). Real Party in Interest.

The real party in interest is BP Corporation North America, Inc., which is a subsidiary of BP America, Inc., which is a subsidiary of BP p.l.c.

(ii). Related Appeals and Interferences

There are no related appeals or interferences.

(iii). Status of Claims

Claims 1, 2, 5-41, 44, 45, and 48-52 are pending. Claims 1, 2, 5-16, 40, 41, 44, 45, 48, and 49 are rejected. Claims 17-39 and 50-52 are withdrawn from consideration.

(iv). Status of Amendments.

There are no after final amendments.

(v). Summary of claimed subject matter.

The invention is directed generally to a process for the separation of solids and liquids. One embodiment of an apparatus for performing the claimed process is

illustrated in FIGS 1 and 2. According to this embodiment, separation of solids and liquids occurs in a filtration zone defined by the interior of a hollow cylinder 11. The cylinder 11 includes filter tubes 17 and the interior of the filter tubes defines a lower concentration zone or lower pressure zone. The interior of the cylinder 11 surrounding the filter tubes 17 defines the higher concentration zone or higher pressure zone. See specification page 10, lines 13-17.

A slurry feed comprising a liquid and a solid is directed into the higher concentration zone through inlet 27. A displacement fluid is fed into the higher concentration zone countercurrent to the flow of the slurry feed through displacement fluid inlet 29. See specification page 10, lines 19-23. Suitable displacement fluids includes those insoluble in the slurry feed components. See specification page 8, lines 12-13. The displacement fluid is injected into the filter column at an opposing pressure sufficient to facilitate the separation of solids and liquids and for at least a portion of the displacement fluid to pass through a filter to the interior of a filter tube 17. See specification, page 11, lines 16-19. The liquid in the solid-liquid mixture passes through the filter tubes, and the filtrate is collected through bottom portion 21. See specification page 13, lines 8-12.

The solids remaining begin to deposit or form a dense phase around or substantially near the filter within the hollow cylinder of the filter column. See specification, page 12, lines 1-3. Once the solid bed is formed, the solid packed bed moves upward towards the open end 15 of the hollow cylinder where it is preferably removed from the filter column via the product chute 33 as a concentrated product. See specification page 14, lines 5-8. Within the filter column, the highest imparted pressure is generally at the slurry feed inlet, the lowest imparted pressure is generally at one or more filters of the filter column at the interior of one or more filter tubes, and the pressure at the product chute is at an intermediate level. See specification page 11, lines 19-23. Since fluid flow in the direction of high pressure to low pressure, this ensures that the fluid(s) in

the filter column move towards the filters. See specification page 11, lines 23-25.

(vi). Grounds of rejection to be reviewed on appeal

1. Whether claims 1, 2, 5-16, 40, 41, 44, 45, 48, and 49 are unpatentable under 35 U. S. C. § 112, first paragraph, for failure to disclose the best mode
2. Whether claims 1, 2, 5-16, 40, 41, 44, 45, 48, and 49 are unpatentable under 35 U. S. C. § 112, first paragraph, for failure to provide an enabling

(vii). Argument

2. Claims 1, 2, 5-16, 40, 41, 44, 45, 48, and 49 are fully enabled under the requirements of 35 U. S. C. § 112, first paragraph.

The Examiner alleges that the specification fails to teach those skilled in the art how a displacement fluid entering through nozzle 29 would be caused to flow in a manner that would displace at least a portion of liquid from a slurry feed.

The Examiner states on page 3 of the Final Office Action of March 25, 2010:

"In this regard, it is noted that the only apparatus disclosed to accomplish this step is Fig. 1, which discloses an open chute 33. As such, it is unclear how the above stated step would be accomplished. It is axiomatic that fluid under pressure will follow the path of least resistance. Referring to FIG. 1, that would be open chute 33."

The appellants submit that the specification gives substantial guidance to the skilled artisan as to how to control pressures in order to perform these processes. Nothing in the specification conflicts with the Examiner statement about flow of fluid from higher pressure to lower pressure:

"Additionally, fluids flow from areas of high pressure to areas of low pressure." Specification page 10, lines 1-2.

"Since fluid flow in the direction of high pressure to low pressure, this ensures that the fluid(s) in the filter column move towards the filters. " Specification page 11, lines 23-25.

However, when the Examiner states that the displacement fluid would flow to the path of least resistance to chute 33, the Examiner makes a false factual assumption and is ignoring a clear teaching of the specification:

"Within the filter column, the highest imparted pressure is generally at the slurry feed inlet, the lowest imparted pressure is generally at the slurry feed inlet, the lowest imparted pressure is generally at one or more filters of the filter column at the interior of one or more filters tubes, and the pressure at the product chute is an intermediate level." Specification page 11, lines 19-23, emphasis added.

Therefore, according to the Examiner's axiomatic rule of fluid flow, the displacement fluid will flow towards the filters, and not to product chute 33.

The Examiner is correct to the extent that specific well-known pressure control devices, such as valves, are not expressly described in the specification or illustrated in the drawings. However, it is noted that each of the claims on appeal are directed to processes, not to apparatus. And it is well settled law that the application need not, and preferably does not, disclose well-known components. See *Hybritech Inc. v Monoclonal Antibodies, Inc.*, 802 F.2d 1367, 1384 (Fed. Cir. 1986).

The specification in many other instances clearly suggests the need to control pressures to perform functions routine to those skilled in the art, such as the need to inject feeds, to vary flow rates, and to control the flow:

"[T]he slurry feed is injected into the filter column at a pressure sufficient to separate solids from liquid and transport solids out of the filter column." Specification page 11, lines 15-16.

"[T]he displacement fluid is injected into the filter column at an opposing pressure sufficient to facilitate the separation of solids and liquids and for

at least a portion of the displacement fluid to pass through a filter to the interior of a filter tube." Specification 11, lines 16-19.

"The higher pressure zone is at a higher pressure than the lower pressure zone. This pressure differential can be measured by any means suitable to demonstrate a pressure gradient across a filter in the filtration zone." Specification, page 9, lines 20-23.

"The displacement fluid initially enters the hollow cylinder 11 at a pressure sufficient for at least a portion of the displacement fluid to pass through a filter to the lower pressure zone" Specification page 15, lines 13-16.

"The opposing pressure of the displacement fluid preferably prevents the slurry feed from completely crossing the filter 23 on its way towards the open end 15 of the hollow cylinder 11." Specification page 15, lines 20-22.

Those skilled in the art would recognize that the device illustrated in Fig 1 is not a stand alone apparatus for performing the process of the present invention and would require routine devices to assist the operation of the claimed process.

FIG. 1 shows flanges at the ends of chute 33, inlets 27, 29, and 31, and bottom or outlet 21, which indicate the presence of other equipment. The specification suggests that the invention will "operate cooperatively and in conjunction with convention unit operations". See specification, page 4, lines 11-12. The valves necessary to control the invention are just not necessary to teach a chemical engineer how to make and use the invention. "One skilled in the art knows how to make a bolt, a wheel, a gear, a transistor, or a known chemical starting material. The specification would be enormous and unnecessary length if one had to literally reinvent and describe the wheel." *Atmel Corp. v. Information Storage Devices, Inc.*, 198 F.3d 1374, 1382 (Fed.Cir.1999), 53 USPQ2d 1225, 1230.

The Examiner further questions the specific pressures described in the Example. The Examiner questions how any displacement fluid introduced at 65 PSIA will flow down filter column 10, when slurry at 210 PSIA is being introduced in the filter column via slurry feed inlet 27. However, the Examiner fails to recognize that the inlet pressure at the slurry feed is not the pressure in the entire column.

There is a pressure gradient in the column. As the liquid of the solid-liquid slurry passes through the filters, the remaining solids form a packed bed or dense phase which must be raised through the column in a continuous manner and exits via product chute 33. The strong pressure at the inlet is necessary to raise this bed against the forces of gravity, friction, and the opposing force of the displacement fluid. In contrast, the displacement fluid enters via inlet 29 into chamber 25 at a location where there is no solids, and only needs to flow downward, and accordingly does not need as strong a pressure as is required at the slurry inlet. Furthermore, as can be seen FIG. 1, the filters 23 extend upward nearly the length of the column 11, and not just by the slurry inlet 27, and therefore should be expected to have a pressure gradient. Importantly, according to the Example, the interior of the filter 17 is kept at 14.7 psia (atmospheric pressure), which is lower than the pressure of the inlet displacement fluid.

Again, the specification provides an enabling description, by providing an explanation of the forces that must be balanced in operation of the filter column:

"The direction that the bed moves, or whether the bed moves at all, is generally determined by the summation of all forces that act on the bed. One force that is imparted on the bed is from all forces that act on the bed. One force that is imparted on the bed is from the liquid in the slurry feed that flows through the bed on the way to the filters. An opposing force is imparted on the bed from fluid(s) and displacement fluid flowing to the filters from the opposite end of the column. For purposes of the present invention, the displacement fluid provides hydraulic force if the displacement fluid is a liquid or pneumatic force if the displacement fluid is a gas. Therefore, the solid packed bed can be pushed by forces from both ends. The bed will move in the desired direction if the force imparted by the liquid in the slurry feed is larger than the sum of all the opposing forces. In addition, the opposing forces may also include the frictional forces imparted on the solid packed bed that act to impede movement of the solid packed bed and the force of gravity." Specification page 12, line 16 to page 13, line 2.

The working Example provides one set of specific pressures and other conditions where the invention was operated. It is noted that the pressures cited in the Example are for the "end of the run", which is at a time whereby the relatively strong pressure at the slurry inlet 27 is necessary because of the build up of the dense solid phase shown in FIG. 2. The appellants' submit that the specification and the specific Example illustrate clearly to one skilled in the art to make and use the invention.

Accordingly, for the reasons above, the appellants respectfully request that the rejection be withdrawn.

2. Claims 1, 2, 5-16, 40, 41, 44, 45, 48, and 49 are not unpatentable under 35 U. S. C. § 112, first paragraph, for failure to disclose the best mode.

The Examiner states that a comparison FIG. 1 of the present application to FIG. 3 of the US 2007/022539 evidences concealment of the best mode. See pages 3-5, Final Office Action of March 25, 2010. In a prior office action, the Examiner makes an extraordinary and completely unsupported allegation: "Applicants recognized the deficiency of this disclosure, and attempted to remedy it in [US 2007/022539]". See page 6 of Office Action of May 7, 2009.

The Examiner has failed to establish a *prima facie* case of concealment of the best mode. The referenced '539 patent application was filed on March 21, 2006, which over two and one-half years after the application on appeal was filed on September 16, 2003. It defies any kind of logic the '539 application can be used to determine the mental state of the inventors at the time of filing of the present application. Furthermore, the Examiner has failed to demonstrate why FIG 3 of the '539 application was allegedly the inventors' best mode. The Examiner has failed to meet the burdens described in MPEP 2165.03 with respect to best mode rejections in *ex parte* prosecution.

"The examiner should assume that the best mode is disclosed in the application, unless evidence is presented that is inconsistent with that assumption. It is extremely rare that a best mode rejection properly would be made in *ex parte* prosecution. The information that is necessary to form the basis for a rejection based on the failure to set forth the best mode is rarely accessible to the examiner, but is generally uncovered during discovery procedures in interference, litigation, or other *inter partes* proceedings Unless the examiner has evidence that the inventors had information in their possession (1) at the time the application was filed (2) that a mode was considered to be better than any others by the inventors there is no proper basis for a best mode rejection."

Emphasis added.

Accordingly, the Examiner has failed to establish a *prima facie* of concealment of the best mode, and therefore the rejection should be withdrawn.

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Respectfully submitted,

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(viii) Claims appendix

1. A process for separating solids from liquids in a filtration zone defining a higher concentration zone and a lower concentration zone, the zones being separated from one another by a filter, the process comprising the steps of:

- (a) flowing a slurry feed comprising a liquid and a solid into the higher concentration zone;
- (b) flowing a displacement fluid to the higher concentration zone countercurrent to the flow of the slurry feed; and
- (c) removing at least a portion of the liquid through the filter to the lower concentration zone;

wherein the displacement fluid is insoluble in the slurry feed components and displaces at least a portion of the liquid from the slurry feed past the filter and into the lower concentration zone to produce a filtrate in the lower concentration zone.

2. The process of claim 1, wherein the displacement fluid is a gas.

5. The process of claim 1, further comprising the step of flowing at least a portion of the displacement fluid from the higher concentration zone through the filter and into the lower concentration zone.

6. The process of claim 2, further comprising the step of flowing at least a portion of the gas from the higher concentration zone through the filter and into the lower concentration zone.

7. The process of claim 1, wherein the slurry feed comprises a product from a crystallization process.

8. The process of claim 2, wherein the slurry feed comprises a product from a crystallization process.
9. The process of claim 7, wherein the slurry feed comprises para-xylene.
10. The process of claim 8, wherein the slurry feed comprises para-xylene.
11. The process of claim 1, wherein the filtrate comprises at least one of ortho-xylene, meta-xylene and para-xylene.
12. The process of claim 2, wherein the filtrate comprises at least one of ortho-xylene, meta-xylene and para-xylene.
13. The process of claim 1, wherein the displacement fluid displaces at least a portion of the liquid from the slurry to form a dense phase in the higher concentration zone.
14. The process of claim 2, wherein the gas displaces at least a portion of the liquid from the slurry to form a dense phase in the higher concentration zone.
15. The process of claim 13, wherein the dense phase comprises a solid packed bed.
16. The process of claim 14, wherein the dense phase comprises a solid packed bed.

40. A solid-liquid separation process comprising:

(a) flowing a slurry feed into a hollow cylinder of a filter column comprising the hollow cylinder and at least one filter tube disposed in the hollow cylinder and extending in an axial direction within the hollow cylinder, wherein the at least one filter tube comprises an integrally attached filter, the filter forming a direct connection between an interior of the tube and an interior of the hollow cylinder; and,

(b) directing a displacement fluid insoluble in components of the slurry feed into the hollow cylinder countercurrent to the flow of the slurry feed,

wherein substantial portions of the displacement fluid and liquid in the slurry feed flow through the filter to form a filtrate inside of the at least one filter tube and a dense phase outside of the at least one filter tube.

41. The process of claim 40, wherein the displacement fluid is a gas.

44. The process of claim 40, wherein the slurry feed comprises para-xylene.

45. The process of claim 41, wherein the slurry feed comprises para-xylene.

48. The process of claim 46, wherein the dense phase comprises a solid packed bed.

49. The process of claim 48, wherein at least a portion of the gas passes through at least a portion of the solid packed bed to the filter.

(ix) Evidence Appendix

None

(x) Related Proceedings Appendix

None